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ABSTRACT

The difficulty students have in transferring what they have learned to "real life" situations is emerging as a major problem. This action research project examined the impact of an intervention to improve transfer of learning by means of student journals and projects, and graphic organizers. Participating in this research were 68 students in seventh grade mathematics and social studies classes in middle or junior high schools; the schools were located in diverse upper middle class suburbs and one diverse lower middle class community. The transfer of learning problem was documented by means of student surveys and journals kept over 3 months, teacher journals, and test grades. A learning survey examined students' application of math and social studies skills, such as figuring out the tip on a restaurant bill or using a road map. The approximately 12-week intervention was comprised of student learning logs/journaling, student projects, and graphic organizers. Evaluation data were collected by means of a learning survey, pre- and posttests, and student and teacher journals. Findings suggested that the most effective indicators of transfer intervention was the student journaling. Test scores were the least effective evaluation tool to indicate transfer. (Appendices include data collection instruments and sample materials. Contains 23 references.) (KB)

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ENHANCING TRANSFER OF LEARNING AMONG SEVENTH GRADERS

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Abstract

This report describes a program for increasing transfer interventions. The targeted population consist of seventh grade mathematics and social studies classes. These classes are located in two diverse upper middle class suburban communities and one diverse lower middle class community. All are located in the western suburbs of Illinois. The lack of student transfer skills were documented through data which included classroom projects, student learning logs, academic assessments, and student surveys.

Analysis of probable cause data reveals that curricular issues, teaching strategies, classroom environment and lack of real-life projects contribute to the problem. After a review, it has been discovered that there is an increasing apathy toward learning. This appears to have an effect on real-life transfer.

A review of solution strategies suggested by experts in the field of metacognition, reveal several strategies. In this report we selected learning logs/journaling, projects and graphic organizers. In this report, these three strategies were chosen as highly effective.

Researchers found that the interventions did increase transfer. However, the most effective indicators of transfer intervention was the student journaling. Test scores were the least effective evaluation tool to indicate transfer.

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CHAPTER 1

PROBLEM STATEMENT AND CONTEXT

General Statement of the Problem

The students of the targeted group of seventh graders exhibit a lack of transfer processes. Evidence for the existence of the problem includes test grades, learning logs which indicates students' understanding, and teacher journal entries that describe lack of transfer.

Immediate Problem Context

Site A, located in the southwest suburbs of a large midwest community, contains 940 K-12 public school students from various ethnic groups. The distribution of these groups is as follows: 88.4% White, 2.6% Black, .7% Hispanic, 8.2% Asian/Pacific Islander, and .1% Native American. There are a total of 18 schools in the district: 11 elementary schools, 5 middle schools, and 2 high school. Site A comes from one of the five middle schools in the district. The attendance rate is 96.8% with no chronic truants and a 3.4% rate of student mobility. The average class size is 25.9 with the following minutes devoted to instruction: 80 for English (reading and writing), 40 for each math, science, and social studies (Site A School Report Card, 1997).

There are 970 teachers in Site A's district. The average teaching experience is 15.5 years with 69.6% of the total number of teachers with a Master's Degree or above. From the total number of district teachers 71% are females and 29% are males. The teachers ethnic/racial background breaks down as follows: 97.6% White, 1.2% Black, .5% Hispanic, .7% Asian/Pacific Islander, and no Native American. The average teachers' salary in Site A's district, as of 1995-1996, is $51,845, with the average administrators' salary being $73,043 (Site A School Report Card, 1997).

Site B, located in the western suburbs of a large midwest community, contains 947 K-12 public school students from various ethnic groups. The distribution of these groups is as follows: 78.9% White, 11.3% Black, 5.2% Hispanic, 4.5% Asian/Pacific Islander, and. .1% Native American. There are a total of sixteen schools in the district: 12 elementary schools, three middle schools, and one high school. Site B comes from one of the three middle schools in the district. The attendance rate is 95.3% with .3% chronic truants and a 10.2% rate of student mobility. The average class size is 28.5 with the following minutes devoted to instruction: 78 for English (reading and writing), 39 for each math, science, and social studies (Site B School Report Card, 1997).

There are 785 teachers in district B. The average teaching experience is 8.9 years with 41.1% of the total number of teachers with a Master's Degree or above.

From the total number of district teachers 79.8% are females and 20.2% are males. The teachers ethnic/racial background breaks down as follows: 97.2% White, 1.7% Black, .4% Hispanic, .8% Asian/Pacific Islander, and no Native American. The average teachers' salary in Site B's district, as of 1995-1996, is $37,487, with the average administrators' salary being $77,400 (Site B School Report Card, 1997).

Site C, located in the western suburbs of a large midwest community, contains 979 K-12 public school students from various ethnic groups. The distribution of these groups is as follows: 82.3% White, 10.6% Black, 6.5% Hispanic, .3% Asian/Pacific Islander, and .1% Native American. There are a total of five schools in the district: Four elementary schools, and one junior high school. Site C comes from the junior high school in the district. The attendance rate is 94.5% with 0% chronic truants and a 34.8% rate of student mobility. The average class size is 27 with the following minutes devoted to instruction: 88 for English (reading and writing), 44 for each math, science, and social studies (Site C School Report Card, 1997).

There are 145 teachers in district C. The average teaching experience is 16.7 years with 30.6% of the total number of teachers with a Master's Degree or above. From the total number of district teachers 85.1% are females and 14.9% are males. The teachers ethnic/racial background breaks down as follows: 100% White. The average teachers' salary in Site

C's district, as of 1995-1996, is $37,463 with the average administrators' being $62,091 (Site C School Report Card, 1997).

The three sites use a textbook based curriculum. Site A, uses Transition to Mathematics (Usiskin et al. 1992). Site B uses Addison Wesley (Eicholex et al. 1992). Site C uses American Nation (Batchelor & Davidson, 1991).

The Surrounding Community

The study being completed draws students from three communities. They have the following characteristics from the United Stated census report (July, 1992).

Community A

Community A demographically can be described as follows: 92.8% White, 2% Black, and 5% Asian/Pacific Islander. In 1990, Community A reported a per capita income of $23,934, and a median household income of $67,827. The mean home value was $188,977. From 1985 to 1988, the percentage of people who move to different households was 43.3%, and from 1989 to 1990 the percentage was 23.3%. The major community support group for the school is a Home and School Committee. This committee consists of parents and school administration. The may focus of this committee is to bring in revenue for school needs. The most current pressing issue is the continuing growth of the community causing overcrowding in the school.

Community B

Community B demographically can be described as follows: 90.3% White, 2.1% Black, 5.8% Asian/Pacific Islander, 2.1% Hispanic and 0.2% Native American. In 1990, Community 2 reported a per capita income of $20,328 and a median household income of $51,311. This community has added within the last year a high school and middle school.

Community C

Community C will have two subsets which can be demographically described as follows:

Subset 1: 82.5% White, 14.4% Black, 1.6% Asian/Pacific Islander, 4.8% Hispanics, and 1.2% other races. In 1990, subset 1 reported a median household income of $33,562. The mean home value was $91,800. From 1985 to 1990, the percentage of people living in different households was 58.7%.

Subset 2: 97.3% White, .2% Black, 1.2% Asian/Pacific Islander, 4.7% Hispanic, and 1.4% other races. In 1990, subset 2 reported a median household income of $33,652. The mean home value was $92,900. From 1985 to 1990, the percentage of people living in different households was 35.1%

Community C, unlike Community A and B, is more of a transient community. There is evidence of growth, but not as significant as the other two communities. In the junior high building they have added five new classrooms with the

anticipation of growth. The school district has within the last year rearranged the boundaries for the elementary schools. This was also to eliminate overcrowding in some of the elementary schools.

The National Context of the Problem

Since the 1980's there have been a number of students crying out for education reform. The two main reasons are low test scores (Daniels, Hyde, & Zemelman, 1993) and businesses expanding training programs because employees lack skills (Jones & Pierce, 1986). Unfortunately, education reform has consisted of placing the blame on someone or on some social problem. Education reform researchers have been looking at the problem in a different way. Researchers are re-examining the curriculum and teaching methods. They are asking the question, "How do we learn, and how can we transfer it to real life problems?" Researchers believe reform will take place when the way the students learn and the way teachers teach is altered.

One theory, the constructivist theory, focuses on the above questions. This theory attacks the traditional teaching method of having students repeat newly presented information in reports or on quizzes and tests. In contrast, constructivist teaching helps the student internalize and reshape new information (Brooks & Brooks, 1993). The book, Best Practice by Daniels, Hyde, and Zemelman, 1993, (p.8), also support the constructivist classroom theory and

describes it in a similar fashion: "Children do not just receive content: in a very real sense, they recreate and re-invent every cognitive system they encounter, including language, literacy, and mathematics." According to the constructivist theorists, if reform in education is to take place, it is to start in the classroom. Transfer of knowledge from the teacher to the student, and student to life is what is lacking.

The argument of how students learn and how teachers should teach have been an ongoing one. Daniels et al. (1993), addresses this argument as follows:

> The last seven or eight years of tumultuous national debate, though it certainly hasn't concentrated upon instruction and curriculum, has nevertheless indirectly prodded further research in these areas. All the people in this alternate, uncoordinated reform movement-teachers, instructional researchers, subject area leaders-have been rethinking the substance, the content, the processes, the methods, and the dynamics of schooling. As a result, in virtually every school subject, there are now recent summary reports, meta-analysis of instructional research, bulletins from pilot classrooms, and landmark sets of professional recommendations. Today, there is a strong consensus definition of best practice, of state-of-the-art teaching in every critical field (p.4).

This state-of-the-art teaching has been sometimes referred to as Whole Language, integrated learning, or some other name. Throughout teaching magazines, reports, and various teaching colleges, this type of teaching has been emerging. This model basically redefines the classroom environment to be more child-centered, emphasizes more class projects instead of homework pages, and alternative ways of assessing students' learning with the use of reflective journaling and portfolios. Teachers encourage students to look at content in new ways which will enhance higher order thinking which often include cooperative groups, graphic organizers, and modeling to improve learning.

CHAPTER 2

PROBLEM DOCUMENTATION

Problem Evidence

In order to document the extent of student transfer, one survey, teacher and student journals, and tests grades over a three month period will be noted. Before the process could begin, each of the three targeted classes were given a learning survey.

Figure 1 indicates the results of the learning survey developed by the researchers given in early September(refer to appendix A). It was given to a math class of 19 students, a math class of 30 students, and a social studies class of 19 students, for a total of 68 targeted seventh grade students. Figure 2 indicates the final grades from the last grading period of 1996-1997 school year. While students indicate transfer of skills in the learning survey, class discussions and tests indicate otherwise. For example, during class discussion, students were asked to identify basic geographic terms and were unable to do so. Another example showed test scores on a geography test were poor overall. In math, students were unable to calculate the amount of a tip given the percent from the total bill. Students had indicated on the survey familiarity to this concept.

Probable Causes

Site-Based Causes

Probable causes have been identified in several ways. First a learning survey was administered to a total of 68 students in Sites A, B, and C. The survey posed applications related to math and social studies skills. The questions were evenly divided among math and social studies to identify the percentage of students' who were demonstrating transfer before any other interventions. The results have been reported on a percentage basis and are displayed below

Learning Survey

		YES	NO
1.	Do you read the newspaper?	54%	46%
2.	When you go to a restaurant, do you know how to add up the bill?	66%	34%
3.	When you are buying something, do you count your change?	81%	19%
4.	When you are shopping for clothes, do you know how much 10% off is?	57%	43%
5.	When someone gives you written directions, do you have a hard time figuring them out?	12%	88%
6.	Have you ever helped your parents use a map on vacation?	63%	37%

7.	Do you know how the United States selects a president?	87%	13%
8.	Do you ever read books about history?	71%	29%
9.	Do you keep a journal?	26%	74%
10.	Do you cook?	82%	18%
11.	Do you compare prices when you are shopping?	85%	15%
12.	Do you or your parents have a savings account for you?	72%	28%
13.	Do you play a musical instrument?	49%	51%
14.	Do you ever teach someone what you learned in school?	68%	32%
15.	Have you ever been on a committee to solve a problem?	25%	75%
16.	Are you a member of a club?	31%	67%
17.	Do you enjoy making things?	91%	9%
18.	Do you do puzzles?	65%	35%
19.	Do you use the computer at home?	74%	26%
20.	Do you know the difference between a country and a continent?	93%	7%

Figure 1: Learning Survey

From this survey, it has been shown that the majority of the students believe they are transferring concepts into real life situations. Comparing the survey results to the

researchers observations, results were found to be contradictory.

FINAL GRADE FOR 1997

LETTER GRADE	PERCENTAGE
A	50%
B	34%
C	13%
D	3%
F	0%

Figure 2. Final grades from the last grading period from 1996-1997 school year.

In Figure 2, even though over 50% of targeted students received the letter grade A, researchers can conclude through classroom discussion, teacher observations, and pre and post tests that transfer was not as high as the letter grade indicated.

Literature Based Causes

The literature suggests several underlying causes for student lack of transfer. According to Adams and Hamm (1996), critical thinking skills are not taught and teacher collaboration across the curriculum is not being utilized to enhance transfer applications. The skills necessary to promote transfer, along with communication across the curriculum are vital for successful transfer.

According to Fogarty (1997), some educators suggest a shift of the paradigms of schooling from environments that demand conformity to rigid teaching and learning structures, to ones where students take command of their education. In the latter paradigm, learning is more authentic and students are doing what Piaget suggests learning results from-acting upon reality. Therefore, Fogarty suggests that students take a role in curricular and instructional modifications which will increase transfer (p. xi).

Further research suggests that a probable cause for transfer is within the structure of the school. According to Brooks and Brooks (1993), based on Ravitch and Finn (1987), fragmentation of curriculum and pressures of time have made intellectual inquiry so highly specialized that, by seventh grade, most curriculums are departmentalized and heavily laden with information to be memorized. During the six hours in school each day, students can see seven and eight different teachers, each charged with teaching a different curriculum. Within this structure, students quickly come to perceive knowledge as separate, parallel strands of unrelated information. Many teachers assume that transfer occurs automatically after a sufficient base of information is acquired. Surveys of high school graduates, however, indicate that the information base is short-term and transfer occurs only sporadically.

Harris (as cited in Costa, Bellanca, & Fogarty, 1992) believes reform needs to take place within the structure of the lesson. Traditional teaching as he calls it, is based on giving information, followed by practice with that information, and some independent work, usually called homework. Traditional teaching then evaluates the learning in the form of a written test. Under this traditional teaching system, those students who do poorly are thought to have not studied sufficiently. Failure is expected of a large segment of the class. At best, it has a 50% success rate. The tradition has condemned half of the students and locked them into a system that denies them opportunity to learn. In other words, students who do not perform well under this system, will continue to be students who do not perform well. Harris believes the traditional teaching system has got to change in order to provide a more flexible system that gives all students opportunity to learn.

In summary, the researcher team developed a learning survey to investigate the targeted groups level of transfer of mathematical and social studies skills. Also, previous year grades were collected. From the results of the survey 15 out of the 20 questions indicated the majority of the targeted students have believed they transferred math and social studies skills into real life experiences. However, the researcher team discovered that the questions were too vague, and students perceived questions differently. For

example, question ten asked if the student cooks, and 82% indicated that they do. The perception of cooking could mean heating food in the microwave to using a recipe. The final grades from Figure 2 indicated over 90% of the students performing at an average level or above were demonstrating learning content and skills.

The researchers agree with the findings of the literature. According to the literature, critical thinking skills, rigid teaching and learning structure, and lack of students taking a role in curriculum and instructional modifications are factors that inhibit transfer of learning. Sites A, B, and C of the targeted groups are learning in a confined environment due to the strict curriculum guidelines and traditional teaching.

CHAPTER 3

THE SOLUTION STRATEGY

Literature Review

Transfer of Learning

What is transfer? Perkins and Salomon define transfer as "a phenomenon in which something learned in one situation is carried over to another." The authors state there are two types of transfer: near transfer and far transfer. "Near transfer occurs when knowledge or a skill is used in situations very like the initial context of learning. Far transfer occurs when people make connections to contexts that intuitively seem vastly different from the context of learning." (Perkins & Salomon, 1992, p.202). Fogarty defines transfer as "...the use in a new context of something learned in an earlier context." (Costa, Bellanca, & Fogarty, 1992, p.349).

How is transfer identified? Fogarty (1992) best describes its identification as a continuum of behaviors. This continuum can be used as an assessment tool. There are levels that range from simple or near transfer to complex or far transfer. This model takes into consideration a number of variables to identify transfer. The following are a few examples of variables: past experiences of the student, prior knowledge of the student, the physical environment where the learning is taking place, and the matching of

learning styles of the student with the teaching styles of the teacher. Figure 3 represents the levels of transfer (see appendix B & C). Each level defines and elaborates with classroom examples of what that level of transfer might look and sound like. Fogarty stresses that this continuum is just a simple framework of the transfer levels. It is not advisable to use this as the only way to identify transfer (Fogarty, 1992).

Interventions

Research has documented numerous ways to increase transfer. The authors of this paper will investigate three ways: project learning, graphic organizers, and journaling.

Project learning is one way to increase transfer. It involves tangible, visible, and personally tailored learning experiences for the students. One good example of project learning is the science project. Project learning has to have the following components: known focus, expectations of productivity, and measurable results. "According to Piaget's research (1952), students move through various levels of understanding, starting with concrete and moving through the representational and abstract." (Fogarty, 1997, p.86). The project provides the various levels. In the science project, a student states a problem, theorizes possible answers, sets out to solve the problem, and finally analyzes the results.

The other two interventions are graphic organizers and journaling. These two interventions are methods for helping

students achieve metacognition: Metacognition is awareness and management of one's own cognitive processes (Winograd & Gaskins, 1992). Learning to understand how to learn is what most experts agree is a necessary link to promote far transfer. In order to help students to become aware of their own thinking, there are several methods available.

Graphic organizers are a way for students to visualize their own thinking patterns. The most commonly known organizer is the web. The web allows the students to see their thinking in process as they brainstorm ideas. Some other graphic organizers are the Venn Diagram, to help compare and contrast, and flow charts, to help with problem solving. The graphic organizer is highly useful in learning concepts from contextual reading. Griffin, Malone, and Kameenui (1995) noted that it is widely accepted by practitioners however, it is most effective when the teachers give explicit instructions during its use.

Journaling, as a metacogitive thinking process, has many uses. For instance, journaling is used to reflect how students think and feel as they work difficult problems. This is known as reflective journaling. The reflective journaling is an excellent tool to help harbor students awareness in their thinking. Journaling also monitors student long and short-term goals that may be measured toward

an end result (Fogarty, 1994). Some examples of journal formats are stem statement, learning logs, predicting, inferencing, goal setting, mental problem solving, and evaluation provide practical use of strategy and opportunity towards structured application.

Problems and Controversy

Not all educators accept the teaching for transfer model. Some educators feel "good ole learning" gets the job done quite well. These educators believe that children transfer naturally, and this is true to some extent. Most of the transfer that takes place is near transfer.

Teachers in this study, as well as others, have noted that students are having great difficulty transferring knowledge just taught. As much as one third of the students in a given class are unsuccessful in demonstrating transfer content of skills taught on a writing test. The more real-life experiences that the teacher applies to his students' learning, improves the efficacy of the transfer.

According to Perkins and Salomon, "If educators cannot help students transfer knowledge and skills, then they have failed to do their jobs."(p.202). Educators need to know how to transfer skills and knowledge in order to meet the demands of the ever changing world. "If transfer of learning is at risk, much of the point and process of schooling is at risk as well." (Perkins & Salomon, 1992, cited in Costa, Bellanca, Fogarty, p.202).

In conclusion, the purpose of this research project is to apply the mentioned interventions with the hope of providing the students with better learning tools, enabling them successful life-long learners.

Project Outcomes

The objective of this project will be to increase student transfer. The seventh grade social studies class and two math classes will increase their scores on tests and projects which focus on transfer. The duration of the research will be from August, 1997 to December, 1997. Methods to measure students progress will include pre and post tests, journaling, and projects.

Solution Components

The graphic organizers and journaling provided to students encourage task completion and a means of regulating and evaluating their progress. Strategy instruction of this kind enables students to confront and solve problems and respond to what they have learned. Project-based learning promotes transfer from one content across disciplines to other subjects and life situations.

Project Action Plan

The subjects will be identified at the seventh grade level from a math class of 19 students, a math class of 30 students, and a social studies class of 19 students. The data will be collected from a learning survey, pre and post tests, and student and teacher journals.

Specific Objective: To increase transfer.

I. Implementation Plan

When: August 1997

What: Team chooses from research three strategies for transfer.

Who's responsible: Team

Who's participating: Target group - 7th grade students in math and social studies classes.

II. Pre-Assessment- Intervention - Post Assessment for Social Studies

When: September - December

What: First Intervention - Project Learning (Sept-Oct)

1. Team teaches Units 4 and 5 in American Nation without interventions.
2. Team administers written test. Record data.
3. Team implements project based on skills learned in project intervention. Record data.
4. Team administers written test based on skills learned in project. Record data.
5. Team has students journal their learning.

What: Second Intervention - Graphic Organizer (Nov)

1. Team teaches Unit 8 section 1 & 2 without graphic organizer.
2. Team administers test on section 1 & 2. Record data.
3. Team assigns students to read section 3 individually.
4. Team places students in cooperative groups to put information into a graphic organizer.

5. Team facilitates discussion about graphic organizers.

6. Team administers test on section 3. Students journaled. Record data.

What: Third Intervention - Journals - (December)

1. Team teaches Unit 9 section using learning log format for notetaking.

2. Team administers test on Unit 9. Record data.

III. Pre-Assessment - Intervention - Post Assessment - Math

When: September - December

What: First Intervention - Project Learning - (Sept)

1. Team teaches unit on decimals and percents.

2. Team administers written test on the unit. Record data.

3. Team implements project learning intervention.

4. Team administers learning log to assess skills learned. Record data.

5. Team has students journal on their learning.

What: Second Intervention - Graphic Organizer -(Oct)

1. Team teaches place values and order of operations.

2. Team administers written test on information taught. Record data.

3. Team has students journal on skills learned. Record data.

What: Third Intervention - Journaling - (Nov)

1. Team teaches fractions and properties for algebra.

2. Team administers graphic organizer activity.

3. Team administers written test. Record data.

4. Team administers journaling on skills learned. Record data.

Methods Assessment

In order to assess the effects of the interventions, pre and post tests covering the content and skills will demonstrate an increase in transfer for mathematics and social studies classes. In addition, teacher and student journals, and surveys will be kept throughout the interventions.

CHAPTER 4

PROJECT RESULTS

Historical Description of Intervention

The objective of this project was to increase the performance of transfer within the math and social studies classrooms. Evidence for the existence of the problem included test grades, learning logs which indicates students' understanding, and teacher journal entries that describe lack of transfer.

Therefore the stated objective was: students' will increase transfer in mathematics and social studies with the interventions of projects, graphic organizers, and journaling.

Interventions

Site A

Cooperative learning with real-life situations such as finding discounts and sale price was implemented into a mathematics class with the intention of increasing transfer of concepts previously taught.

The first intervention was the M & M project which was project based learning. The objective of the unit was to learn about decimals and percents. On September 9, a quiz was given on the first half of the unit to identify the level at which the students were performing. On September 16, a second quiz was given to identify whether students' had

mastered transfer of content of the material in the unit. The final test was given on September 22.
This was the last check for mastery of the concepts taught without the intervention. To close the unit, the M & M project was implemented on September 29 (refer to Appendix D).

The main purpose of the M & M project was to have students use the concepts of decimals and percents in real-life situations that used money. The M & M project was scheduled to take one class period. The students were to work individually as the researcher explained the directions. The researcher observed the way that students were organizing their M & M's. At the conclusion of the project, each student was asked to answer a few questions such as how close he/she was to the actual amount. The researcher felt that the project was very successful and went as planned. It provided the students with ideas of where decimals and percents are used in real-life.

The second intervention was the use of a graphic organizer. The objective of this unit was to understand place values and order of operations. On September 23, the unit began with reviewing place values. On the first half of the unit, the first quiz was given on October 1. From October 2 through the 7, the second half of the unit was taught. The second quiz was then given on October 8 to again check for understanding. The final test was given on October

16. To wrap up the unit on place values and order of operations, the students were asked to create a graphic organizer that could always be referred to later on as a review tool. This activity occurred on October 17th (refer to Appendix E). This intervention unfortunately did not work out as planned due to a time constraint. Therefore, the researcher created the graphic organizer in class and explained the importance of the process. To verify the positive effect of graphic organizers, the researcher implemented additional graphic organizers focusing on fractions (see Appendix H and L). The researcher also incorporated a different activity that allowed the students to record data on paper in a graphic organizer fashion and reflect on how he/she felt about the activity. The students did a very adequate job on this (see Appendices F & G).

The third intervention was journaling, which uses higher order thinking skills. The objective of this unit was to master adding fractions and basic algebra equations. From October 20 through 24, the first half of the unit was taught with lectures. The first quiz was given on October 27 to identify which students have mastered the concepts taught. The second quiz was given on October 31 to check for complete understanding of the first three-fourths of the unit. The final test was given on November 6 on the entire

unit. The intervention was implemented on November 7, which allowed the students to think on their own about the importance of fractions in the real world (refer to Appendices H & L). This intervention went as scheduled.

Site B

The initial plan called for a preassessment quiz to enable the targeted math students to call upon prior knowledge. The quiz revealed a lack of adequate recall of key concepts. This enabled students to recognize what goals they may need to achieve in order to have a successful learning experience. These goals were clarified in the student journals. Students were then taught the material they were tested on and assigned a project based on the same concept. A few students attended after-school study sessions if they needed extra help with concepts. Journals were utilized to record goals and processes towards their achievement of these goals. The journals provided students with a concrete learning experience.

The first unit that was taught from the end of August to September was on fractions, decimals, and percents. A quiz was given on the first half of the chapter to identify levels of student performance on September 10, and the quiz grades were recorded.

A second quiz was administered on September 18, to identify students' mastery for three-fourths of the material in the unit. The final test was administered on September

25. This was the final check for concept mastery without use of an intervention. To finalize the unit, the first intervention was implemented, an M & M project, on September 26 (see Appendix D). The main focus of this intervention was to have students use the concepts of fractions, decimals, and percents utilizing real-life application and situations.

The second intervention was the graphic organizer. The objective of this unit was to understand order of operations and integers. On September 30, the unit began by instructing students in the use of graphic organizers as a learning tool. Each day, until the first quiz on October 7, students were versed in utilization of this tool as a way to organize important concepts. From October 7 through the 14, the second portion of the unit was taught. The second quiz was given on October 15 to monitor students understanding. The final test was given on October 22. Students then spent an entire lesson reflecting on the use of graphic organizers.

The third intervention was journaling. This intervention encouraged students to use higher level thinking skills. The objective of this unit was on algebraic concepts and applications. From October 23 through October 30, the first portion of the class was taught by lecture. The first quiz was given on November 5 to identify student mastery concepts taught. The second quiz was given on November 12 to check for complete mastery of the first three-fourths of this

unit. The final test was given on November 18 for the entire unit.

Site C

On September 8, the unit started about the early American Colonies. Objectives of this unit were to describe the differences of the New England, Middle and Southern Colonies. Researchers taught by lecture, discussion, and practice of concepts. A test was given on September 19. Students also wrote reflections about their study habits. Intervention began on September 23. The intervention was project-based learning. The project was a simulation of the colonists coming to America. The objective in the project was to give students a sense of the various difficulties the colonists faced as they traveled and settled in the New World. The project consisted of map skills, quiz on map skills, team building activities, decision-making, role playing, and recording data. The evaluation of learning was combination of a map skill quiz, completion of a series of charts that recorded data, and a teacher-made test on October 14. A class discussion followed the test about the comparison between the two types of learning done by the students. The project was modified from Discovery 3, a simulation of early American colonization by Wesley (1992). The project went as planned. On November 13, the researcher began a unit about the American Revolutionary War. The objectives of the unit were to identify main battles, the

historical figures, and causes and effects of the Revolutionary War. After a brainstorming session, the students read, discussed, and took notes on the first two sections of the unit. A quiz was administered on November 18. The researcher assigned the target group to read section three of the unit, record interesting features of each of the battles, identify the generals involved, and the outcome of each battle. The next day the group studied various types of graphic organizers and their importance in helping learn information. The students were placed into heterogeneous cooperative groups and instructed to put the information about the battles into their own self-made graphic organizer. On November 20, the students took a quiz regarding the information learned about the battles. Students also reflected about the graphic organizers through a series of questions attached to the quiz. The researcher taught the rest of the chapter through lecture, notetaking, and practice. A test was given on November 26.

After reviewing the pre and post intervention quizzes, the researcher was not satisfied with the results of the post intervention quiz. The researcher felt the post intervention quiz was not a adequate evaluation of transfer. The quiz only evaluated one aspect of the content presented. The researcher decided to redo the intervention.

On January 20, the researcher tried the intervention

again. The objective of the lesson was to learn the process of how a bill becomes a law for the US Constitution Unit. The students copied a flow chart, as the teacher explained the process of a bill becoming a law. The students were quizzed on the bill process on January 21. The researcher asked the students if they thought they did well on the quiz. The majority of the students felt they were successful on the quiz. However, 11 out of 24 students received below 60%. The students were put into heterogeneous pairs. They were given a flow chart that included the steps of the bill process (see Appendix M). The pairs manipulated the steps back into correct order as they quizzed each other. On January 22, they were quizzed with the exact format as the first time. This time only two students scored below a 60%. After the scores from both quizzes were given to the students, a class discussion followed reflecting the studying process using a graphic organizer.

On December 1, the researcher introduced a unit about the Articles of Confederation and the problems America had with this weak Constitution. The objectives of the unit were to: identify the problems of the young nation, to identify the compromises made under the new constitution, and to explain the idea of federalism.

There was no pretest given. In previous units, the teacher modeled and required students to use the outline

format for notetaking (see Appendix N). For this unit, the teacher taught concepts using the learning log format for notetaking (see Appendix O). The researcher reminded students about good study habits and discussed how to use the learning log. The researcher gave a test on December 17. Students reflected their thoughts about using the learning log. The journaling intervention went as planned.

Presentation and Analysis of Results

Site A

The school year began with a unit on decimals and percents. The first quiz was given on September 9 without any interventions. The average score was a 90%. The second quiz given on September 16 had an average score of 75% The final test given on September 22, again without interventions showed an average of 81% for the entire class. Students were taught material through lecture and class discussion utilizing the overhead.

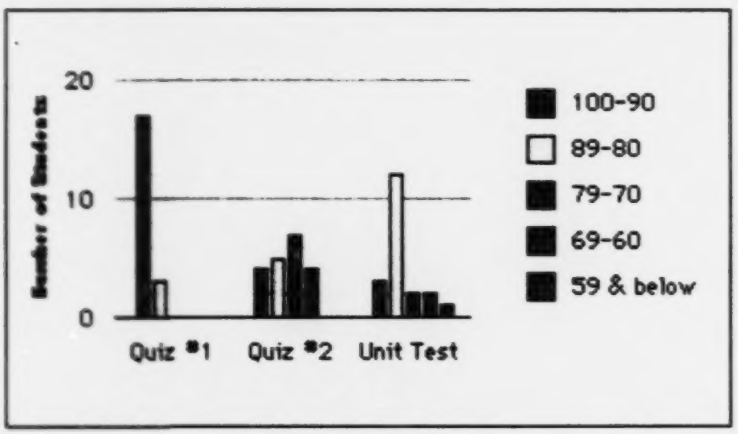

Figure 3: Results of the First Unit quiz and test scores.

In figure 3, there were 20 students that scored 90% and above, and 3 students that scored 80% and above on quiz one. There were 16 students that scored 70% and above, while only 4 that scored between 69% and 60% on quiz two. For the unit test there were 17 students that scored 70% and above with 3 students below 69%. Due to a new student, the targeted number changed by one. The intervention did not occur until after all quizzes and test.

The second unit on place values and order of operations began immediately after M & M project. This unit took approximately three weeks as planned. The first quiz, given on October 1, showed an average of 70% for the entire class. The second quiz, given on October 8, had an average score of 77%. The final test, given on October 16, had an average 82% for the entire class.

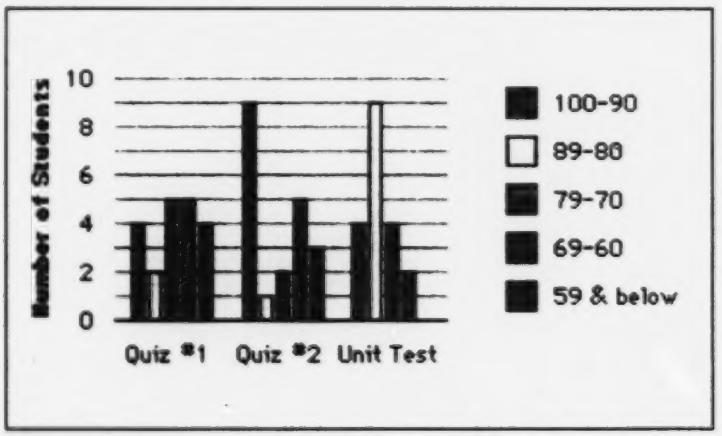

Figure 4: Results of the Second Unit quiz and test scores.

In figure 4, there were 11 students that scored 70% and above, and 9 students that scored 69% and below on quiz one. There were 12 students that scored 70% and above, and 8 students that scored 69% and below on quiz two. For the unit test there were 17 students that scored 70% and above, and only 2 students that scored between 69% and 60%. Due to a student transferring out, the targeted number changed by one for the unit test only. The graphic organizer intervention was not completed until after all quizzes and test.

The researcher modeled and explained graphic organizers and the importance of using one. The researcher planned on having the students create their own graphic organizer with order of operations. However, due to time constraints, this was unable to occur. Therefore, the researcher incorporated an activity which allowed the students to present information in a graphic organizer fashion. The students did an excellent job creating their organizers and reflecting thoughts (see Appendix L).

The final unit focused on fractions and basic algebra concepts. This unit took about two weeks. The first quiz, given on October 27, had an average score of 78%. The second quiz, given on October 31, had an average score of 78%. This entire unit was taught strictly with lecture and class discussion with little to no interventions. The final test was given on November 6 with an average score of 79% for the entire class.

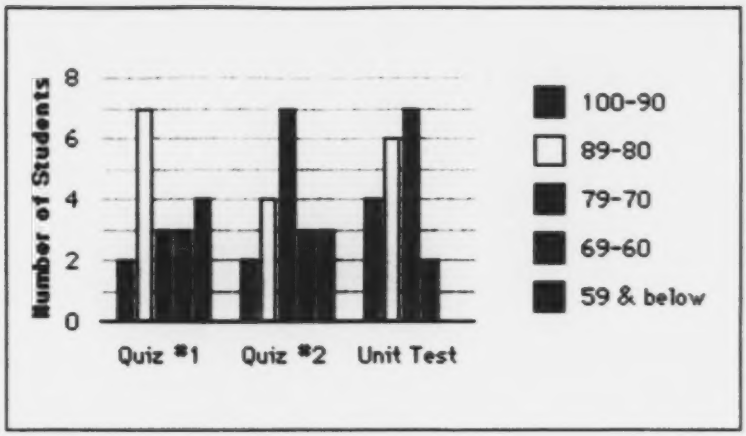

Figure 5: Results of Third Unit quizzes and test scores.

In figure 5, 12 students scored a 70% an above, and 7 students scored 69% and below on quiz one. There were 13 students that scored 70% and above, and only 6 students that scored 69% and below on quiz two. For the unit test, there were 17 students that scored 70% and above with only 2 students that scored between 69% and 60%. Due to a student transferring out, the targeted number changed by one student. the learning logs intervention did not occur until after all quizzes and test.

However, after reviewing the Unit Two and Three Cumulative Tests, the researcher felt that since there were 17 students that scored 70% and above on both tests. The reason being previously taught concept were included on the tests with interventions being completed, transfer was evident (see Appendices T and U).

Site B

The school year began with a unit on fractions, decimals and percents. The first test was given without use of interventions, on September 10. The average grade was 77.5%. Next, a second quiz was administered on September 18, to identify student concept mastery for the three-fourths of the unit. The final test on September 25, again, without use of intervention showed an 84% average for the entire class. Students were taught by lecture and demonstration utilizing the overhead and blackboard. No other interventions were utilized.

The final portion of the unit consisted of a M & M project-based learning experience (see Appendix D). A great deal of excitement was generated with this real life application of fractions, decimals, and percents using colored candy.

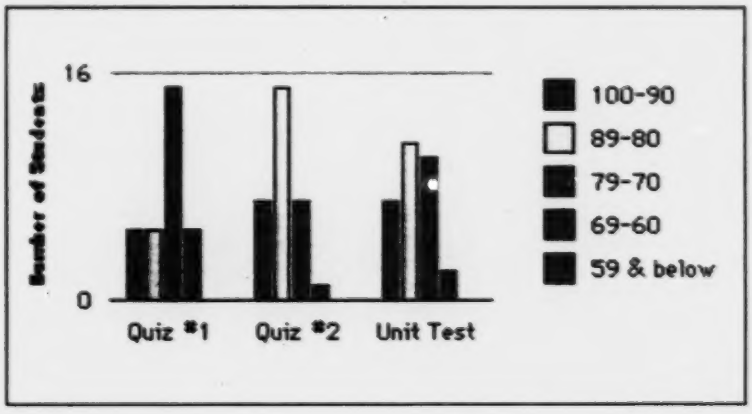

Figure 6: Results of First Unit scores.

In figure 6, there were 5 students that scored 95%, 5 that scored 80%, 15 scored 75%, and only 1 that scored 65%. No other student scored below 65%. This was a preassessment test given without the use of interventions. The second quiz was given, again, without use of intervention, to monitor student level of mastery. The majority of students scored 85% and above, with only 7 at 75%, and 1 and 60%.

Our next unit focused on order of operations and integers. The use of a graphic organizer was explained and demonstrated. The quiz given on October 7, had an average score of 80%. The second quiz given on October 15 had an average score of 83%. The final test was given on October 22, and the class averaged 87% on this test.

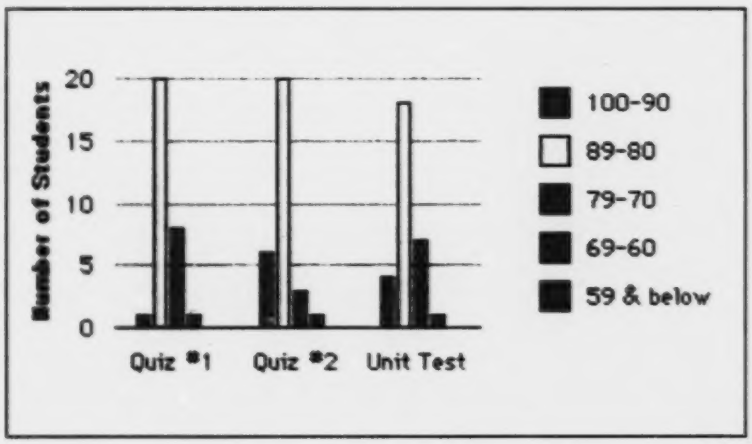

Figure 7: Results of Second Unit scores.

In Figure 7, there were 21 students that scored above average and 8 with an average grade. Only one student scored below 70%. This was the first quiz given after students were instructed in the use of graphic organizers and the idea was still new to them. For the second quiz there were 26 students above average and 4 that fell between 75% and 60%. The final test on order of operations and integers was most positive with 22 students above average and only 7 in the 75% range and one at a 65%.

The third unit began on October 23. It took approximately four weeks to complete this unit as planned. The first quiz given on November 5 had an average score of 85%. The second quiz was given on November 12 and had an average score of 85%. The final test was given on November 18 and showed a class average of 88%.

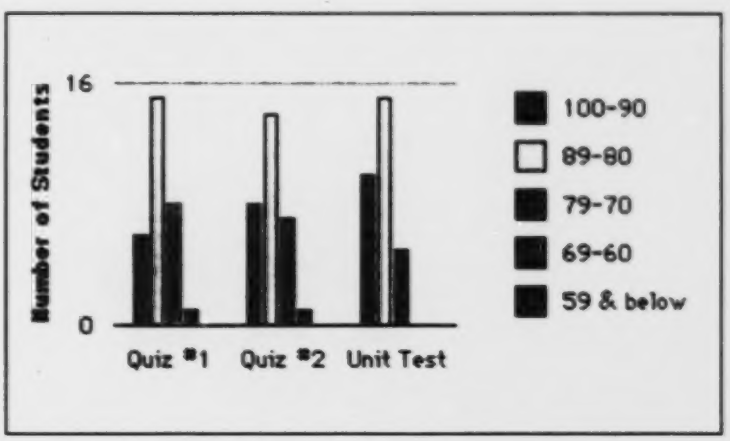

Figure 8: Results of the Third Unit scores.

In Figure 8, on the first quiz, 21 students scored 85% and above, with 8 scoring 75% and 1 at 60%. On the second quiz, 22 students scored 84% and above, 7 scored 70% and above, and only one scored 63%. The final test had 10 students scoring 100%, 15 at 82% and above, and 5 at 75%. No one scored below 70%.

Site C

The targeted social studies class of 19 students changed throughout the interventions. Students' schedule changes and new transfers into the district were the two reasons. There were 25 students for the project intervention, 28 students for the graphic organizer in November, 24 students for the graphic organizer in January, and 28 students for the learning log intervention.

The intervention used was a simulation of the early American colonization. The intervention took approximately three weeks. The students formed teams that represented different colonies. They had to demonstrate map skills, role play, use decision making skills, and record data as well as compete with the other teams.

The researcher compared the results of the preintervention test and the composite grade of the simulation to evaluate if transfer of concepts took place. The preintervention was a unit about the American colonies. The objective was to learn the difference and similarities of the New England, Middle, and Southern Colonies. The

simulation objective was to mainly give the students a sense of the various difficulties the colonists faced as they traveled and settled in the New World. The evaluation of transfer was a composite of the map skill quiz, the completion of the charts, and the test.

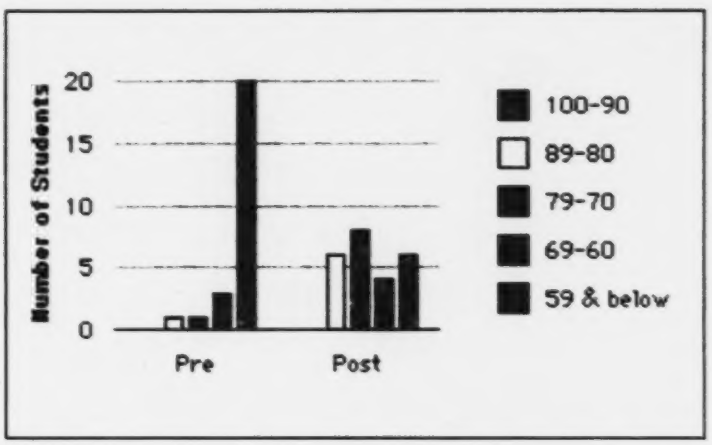

Figure 9: Pre and Post Intervention Results for Projects.

In figure 9, only five students scored 60% and above on the preintervention test. There were 18 students that scored 60% and above on the post intervention test. Also to note, the lowest score was an 8% on the preintervention test and a 50% on the post intervention test. Therefore, the project intervention appears to show an increase in transfer.

The second unit focused on the American Revolutionary War. The first set of scores was from a quiz given on November 18, after lecture, discussion, and notetaking. After

the students read information and devised a graphic organizer of the information in small cooperative groups, the second quiz was given on November 20. The groups shared their graphic organizers at the end of the class. After taking another look at the post intervention quiz, the researcher felt the post intervention quiz was not a fair evaluation of the information learned because it only evaluated one type of information learned. On January 20, the intervention was reintroduced. The pre and post intervention quizzes were identical. The students took the preintervention quiz on January 21, after information was presented in a flow chart that they copied from the blackboard. The post intervention quiz was given on January 23 after the students, in pairs, manipulated the flow chart.

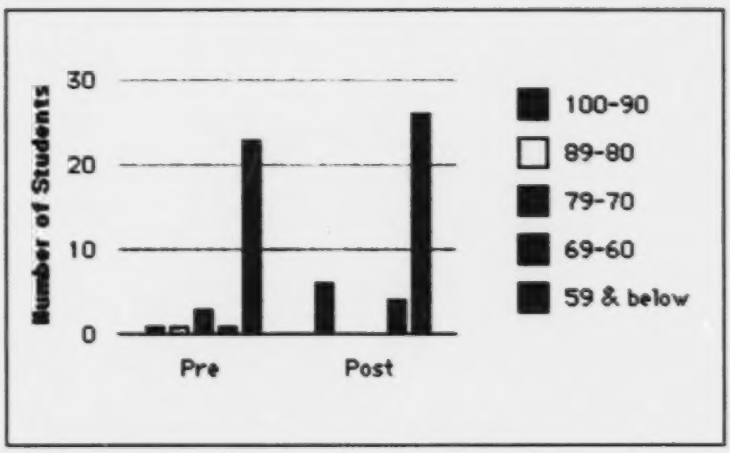

Figure 10: Results for pre and post intervention for Graphic Organizer for November.

In figure 10, 10 students scored 60% and above after the intervention compared to 6 students that scored a 60% and above before the intervention. Therefore, it appears that there was an increase in transfer. However, the post intervention quiz was not a fair evaluation of transfer due to inadequate quiz questions.

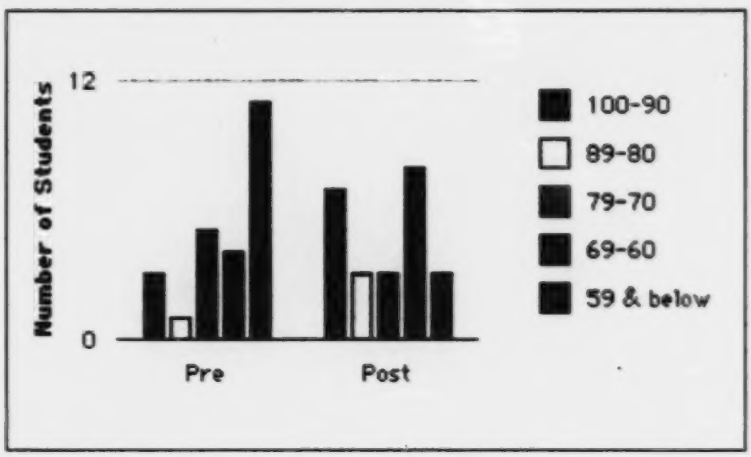

Figure 11: Results of the Pre and Post Intervention for Graphic Organizers in January.

In figure 11, 21 students scored a 60% and above on the post intervention quiz. There were only 13 students that scored 60% or above on the preintervention quiz.

The results of the journaling were evaluated in a unit test. The results of the Unit 9 test were compared to a previous Unit 7 test. The transfer of learning was determined through the comparison of the Unit 7 test to the Unit 9 test.

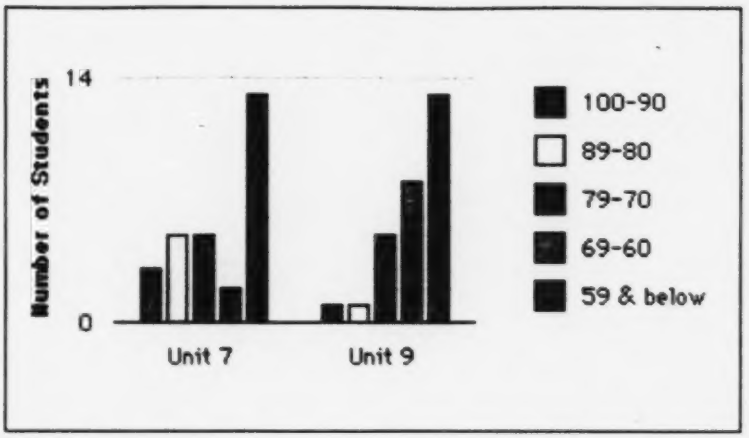

Figure 12: Results of the Pre and Post Intervention for Learning Logs.

In figure 12, data does not clearly show transfer increase after the intervention. There were 13 students that scored above 70% on the Unit 7 test, on which no intervention was used. Only 7 students scored above 70% on the Unit 9 test, which included intervention.

Student Journal Entries

Site A and B

After each intervention, the researchers gave their students an opportunity to reflect on their learning experiences. Samples of these reflections are in Appendices D, I, J, and L.

The first intervention was project-based, an opportunity to understand fractions, decimals, and percents using colored candy (see Appendix D). Students reflected on ideas they had gathered from this discussion. They also reflected about

connections that could be made with other ideas and questions they still have. For example, in student sample A, it was noted that this could be used to compare the amount of predicted sales to the actual sales. In student sample B, it was noted that fractions are used in everyday life such as dividing candy.

In the second and third intervention, graphic organizers and journaling, there was evidence of transfer (see Appendices I, J, and L). For example, in student samples, it was recognized how important math is in the everyday life and in outings with friends.

Site C

After each intervention, the researcher gave students a chance to reflect on their learning experiences. Samples of the reflections are in Appendices P, Q, R, and S.

The first intervention was project-based learning, the simulation of the early American Colonies immigration to the New World. The students reflected on their student skills. The following questions were asked:

1. What was I supposed to do to prepare for this test?
2. How did I study for this test?
3. What can I do to improve my studying?

The student reflections clearly show a lack of study skills. In sample A, in response to question 2, the student wrote that he forgot his book. In sample B, the student wrote that she looked over the words in her spiral (notes in the spiral

notebook), and in response to question 3 she felt that studying for one hour would improve her study skills (see Appendix P).

After the simulation, the researcher was delightfully surprised at the comments given by the students after a class discussion about the pros and cons of the simulation. The researcher reflected on student comments in her journal (see Appendix Q). The students indicated that working together was difficult. This comment was again transferred when it matched with the post intervention test question asking, "Of all the skills that colonists had to learn, what was the most difficult?" About 50% of the students answered that learning to work together was the colonists' most difficult skill to learn. Some students even further commented that compromise and communication were examples of the colonists' most valuable skill of working together. This showed the researcher that the simulation was successful in demonstrating increase of transfer.

The second intervention was the graphic organizer. Students devised their own organizer to help learn about the Revolutionary War battles. Students reflected their feelings about the organizers (see Appendix R). The answers showed the students' feelings. For example, they learned more easily and felt more confident in knowing the information learned via the graphic organizer. In Sample A, the student recorded that the graphic organizer helped him keep the

information organized. Another student felt as if he studied "harder" (see Sample B). The researcher believed that the student felt that he worked harder because, as part of a small group, he had to design an organizer and decide which information goes into the organizer. The researcher believed that the graphic organizer was successful in helping the students transfer information even though the quiz was not a fair evaluation of content learned. The researcher decided to reintroduced the graphic organizer in another lesson. The post intervention quiz scores indicated transfer.

The final intervention was the learning log. The students learned how to take notes using a learning log (see Appendix S). The students recorded their feelings about the effectiveness of the learning log. The post intervention test scores did not show a significant transfer increase. The researcher believed that the timing of the unit and test was a deterrent The unit was introduced on December 1. The test was given on December 17, right before the winter break. The researcher believed, however, transfer of notetaking skills was increased. In Samples A and B, the students felt the learning log was a better form of notetaking because they felt that choosing important facts on their own was better than the teacher choosing the information for them. In Sample C, the student believed the information was more "fluent" in her mind. She thought that if asked about any

information learned, she would be able to answer it correctly.

In conclusion, the researchers felt the interventions were an overall success. The quizzes and tests showed increase in transfer of content. However, the student reflections showed that the interventions were successful on a different level. The reflections showed that the students learned how to study, which is a more valuable tool in the researcher's mind. The interventions taught the researcher that reflections not only could be used in the future for evaluation of content, but an even more accurate tool of evaluation.

Conclusions and Recommendations

Overall, based on the presentation and analysis of the results of transfer applications, the student displayed a remarkable improvement in transfer of concepts. The use of project-based learning, graphic organizers, journals and learning logs provided impetus to student motivation and performance demonstrated on tests and homework. The quality of class discussions, relationships to real-life applications, reflections and goal-setting were exemplified by use of these interventions.

The researchers felt that the quiz and test scores were not the best indication of transfer. Some of the variables that influenced this conclusion were poor test taking skills, study skills, and long term memory retention. However, the

researchers believed that transfer is better exhibited through journals (see Appendices I, J, K, L, P, Q, R, and S). One change researchers suggest, is that more time be spent on student reflection and class discussion to help evaluate transfer. It seemed to be most powerful in demonstrating transfer.

One problem that worked against transfer was at site C. The 40 minute class period made it difficult to implement the interventions effectively. The project-based learning intervention was the most difficult because the project had detailed instructions. The researcher modified the project to fit the school schedule, but found it very frustrating to execute regardless of the modifications. The graphic organizer intervention was also difficult to execute due to the time restraints. For example, the researcher would present the information one day, have the students form groups and work on the organizing of the information another day, and the last day reflect on the information learned. The third day lost its impact because the students' mind set was disrupted. The researcher found that higher thinking skills such as organizing information needs time and needs to be discussed in the same time frame.

Researchers recommend educators rethink their methods of teaching as well as their evaluation process. The target students seemed to have benefited from developing skills obtained from journals, project-based learning, and graphic

organizers. These interventions increased the students' skills to self-reflect, organize information, and problem solve. This resulted in increased transfer. In order for the intervention to be successfully implemented, the researchers further recommend restructuring classes by arranging the classroom to foster dialogue, beginning class with a problem or controversy, using silence to encourage reflection, and creating a hospitable environment. Finally, the evaluation process should include the work of the students and less dependent on the scores of written tests and quizzes.

In the future, the researchers will incorporate transfer interventions in their unit planning. The researchers will also investigate other interventions that will increase transfer. Lastly, the researchers will alter their evaluation process by including student journals, project-base learning, allowing students to show transfer through graphic organizers and less use of the written test.

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APPENDIX A

Name_____

Date_____

LEARNING SURVEY

Directions: Circle "yes" or "no" to answer each question. Remember to include the questions on the back.

1. Do you read the newspaper?

   yes no

2. When you go to a restaurant, do you know how to add up the bill?

   yes no

3. When you are buying something, do you count your change?

   yes no

4. When you are shopping for clothes, do you know how much 10% off is?

   yes no

5. When someone gives you written directions, do you have a hard time figuring them out?

   yes no

6. Have you ever helped your parents use a map on vacation?

   yes no

7. Do you know how the United States selects a president?

   yes no

8. Do you ever read books about history?

   yes no

9. Do you keep a journal or diary?

   yes no

APPENDIX A CONTINUED

10. Do you cook?

yes no

11. Do you compare prices when you are shopping?

yes no

12. Do you or your parents have a savings account for you?

yes no

13. Do you play a musical instrument?

yes no

14. Do you ever teach someone what you learned in school?

yes no

15. Have you ever been on a committee to solve a problem? If so, name the committee.

yes no

16. Are you a member of a club?

yes no

17. Do you enjoy making things?

yes no

18. Do you do puzzles?

yes no

19. Do you use the computer at home?

yes no

20. Do you know the difference between a country and a continent?

yes no

APPENDIX B

LOOKING AND LISTENING FOR TRANSFER

Model	Illustration	Transfer Disposition	Looks Like	Sounds Like
BIRDS				
Ollie the Head-in-the-sand Ostrich		*Overlooks*	Persists in writing in manuscript form rather than cursive. (New skill overlooked or avoided.)	*"I get it right on the dittos, but I forget to use punctuation when I write an essay."* (Not applying mechanical learning.)
Dan the Drilling Woodpecker		*Duplicates*	Plagiarism is the most obvious student artifact of duplication. (Unable to synthesize in own words.)	*"Mine is not to question why—just invert and multiply."* [When dividing fractions.] (No understanding of what she or he is doing.)
Laura the Look-alike Penguin		*Replicates*	"Bed to Bed" or narrative style. "He got up. He did this. He went to bed." or "He was born. He did this. He died." (Student portfolio of work never varies.)	*"Paragraphing means I must have three 'indents' per page."* (Tailors into own story or essay, but paragraphs inappropriately.)
Jonathan Livingston Seagull		*Integrates*	Student writing essay incorporates newly learned French words. (Applying: weaving old and new.)	*"I always try to guess (predict) what's gonna happen next on T.V. shows."* (Connects to prior knowledge and experience; relates what's learned to personal experience.)
Cathy the Carrier Pigeon		*Maps*	Graphs information for a social studies report with the help of the math teacher to actually design the graphs. (Connecting to another.)	From a parent: *"Tina suggested we brainstorm our vacation ideas and rank them to help us decide."* (Carries new skills into life situations.)
Samantha the Soaring Eagle		*Innovates*	After studying flow charts for computer class, student constructs a Rube Goldberg-type invention. (Innovates; diverges; goes beyond and creates novel.)	*"I took the idea of the Mr. Potato Head and created a mix-and-match grid of ideas for our Earth Day project."* (Generalizes ideas from experience and transfers creatively.)

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LETTER

SkyLight
Training and Publishing Inc.

FAX to 708-728-3114

February 26, 1998

Wilkins School
Attn: Sherry Shelley
Justice, IL 60458

Dear Ms. Shelley:

Thank you for your request to reproduce the chart on page 351 of *If Minds Matter*, Vol. 2. Permission to include the material in your thesis, as specified in your letter, is granted with the stipulation that the following credit lines be included with the material:

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Best regards,

Sue Schumer

Sue Schumer
Editor

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APPENDIX D FOR SITE A

Name_____

Date_____

M&M MATH

Try to guess how many of each color you will have without opening you bag!

BLUE:

GREEN:

RED:

YELLOW:

BROWN:

ORANGE:

Now, put beside the number of each colored M&M's a money value including all coins plus half dollars and dollars.

For example:

BLUE: 5 .10

After you give each color a money value, calculate the total dollar amount for your guesses.

Now, open up your bag of M&M's and see how close you came to having the amount of each color you guessed above. After you count each amount, write the number next to the money value you assigned to each color. Finally, calculate the total dollar amount of the actual count for each color.

YOU MAY NOW EAT OR SAVE YOU M&M'S !!!!

1. How close was I to the actual amount?

2. How could I use this in another way?

APPENDIX D CONTINUED

SAMPLE A FROM SITE A
STUDENT JOURNAL FROM M & M PROJECT

THINK ABOUT THE ACTIVITY YOU HAVE JUST COMPLETED AND ANSWER THE FOLLOWING IN THREE OR MORE SENTENCES.

HOW CLOSE WAS I TO THE ACTUAL AMOUNT?

The real thing was only .3% off, I didn't get any orange ones so that really threw me off.

HOW COULD I USE THIS IN ANOTHER WAY?

Maybe when I get older and I open a stole I can predict what will be said and I can compare it to the actual amount sold and that can help me with my sales.

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APPENDIX D - CONTINUED

SITE B: M&M PROJECT

WITHOUT opening your bag of candy, predict how many of each color you will have and record your results below:

BLUE:

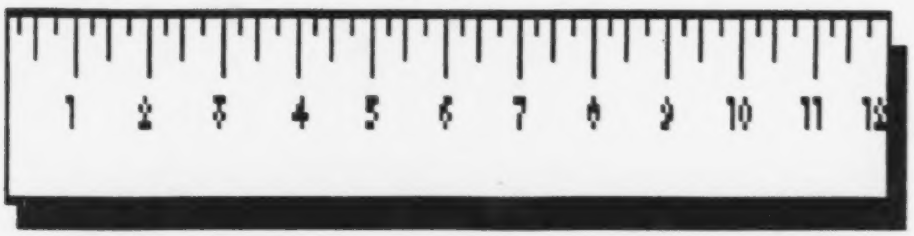
GREEN:

YELLOW:

BROWN:

RED:

APPENDIX D - CONTINUED
SITE B: M & M PROJECT



Next, assign a monetary (coin value) to each color and total the amount by multiplying the prediction by the value. An example is given below to help you get started:

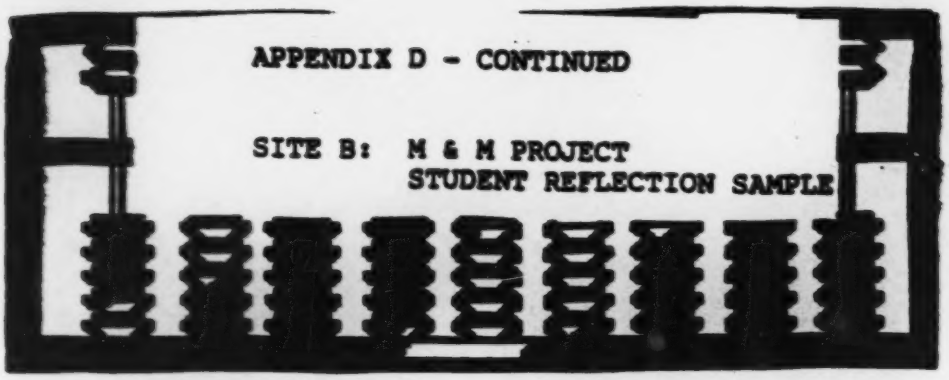
BLUE: 2 ---$1.00 = $2.00

Do this for each color and then total the amount for all of the colors to a dollar amount. Next, without eating any candy, open your bag and actually count how many you have of each color. Next to your prediction and dollar amount, for each color, record the actual amount and tally the dollar amount next to it. An example is given below:

BLUE: 2---$1.00 = $2.00 ACTUAL BLUE: 4--$1.00 = $4.00

Do this for each color, making a column to the right of each line of your predictions. Next, total all the amounts for the actual as you did for your prediction.

Compare the amounts. Subtract your prediction total from your grand total. How far were you from the actual?



NAME: [redacted] DATE: 9-26

TOPIC: Candy M+M math

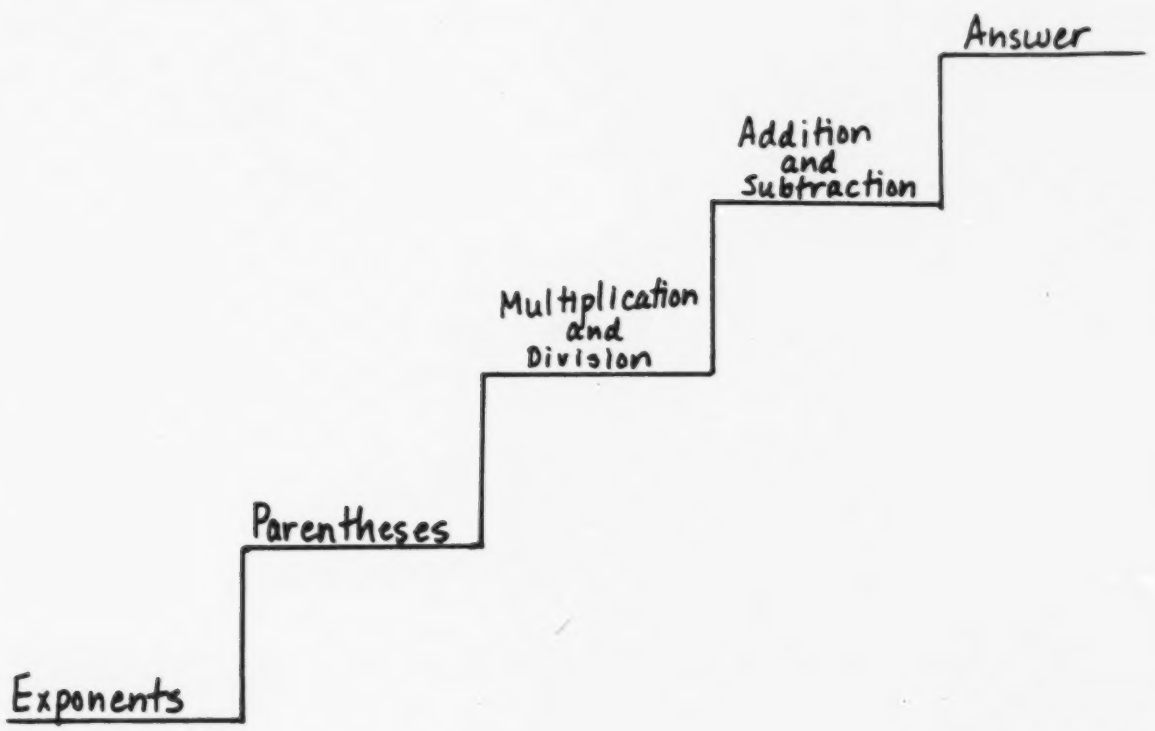
1. Key ideas from this discussion: factions are used in our every day lives not just in math class.

2. Connections I can make with other ideas: factions can be used in something dividing up a candy bar

3. Questions I still have: I have no questions.

APPENDIX E

STAIRS TO UNDERSTANDING ORDER OF OPERATIONS



APPENDIX F

DINNER AT CONNIE S

TASK: To calculate the total bill, tax (6.75%), and tip for the server.

DIRECTIONS:

1. Each person must order an entree, beverage, and dessert of his/her liking.
2. Calculate the total bill including tax for the entire group.
3. Calculate the tip at 15% of total bill.
4. Place the items ordered for each person, total bill for the group, tax, and tip on paper provided.
5. Present this information to your classmates.

DISNEY STORE SHOPPING SPREE

TASK: To calculate the shipping and handling and tax for your groups order.

DIRECTIONS:

1. As a group, choose three items of your choice.
2. Calculate the total of the items.
3. Calculate the tax on the total (6.75%).
4. Calculate the shipping and handling charge according to the order form.
5. Place all items and calculations on the paper provided for presentation.

KOHL'S SHOPPING SPREE

TASK: To calculate the discount and sale price on three items in the catalog provided.

DIRECTIONS:

1. Your group is allowed $25.00 total.
2. As a group, choose three items of your choice.
3. For each of the items, calculte the discount and sale price with tax (6.75%).
4. Total up the sale prices to make sure you are not over the limit.
5. Place all information on paper provided for presentation.

APPENDIX G

JOURNAL ON
CONNIE'S PIZZA VISIT
KOHL'S SHOPPING
DISNEY CATALOG SHOPPING

1. What I liked best about this activity was.....

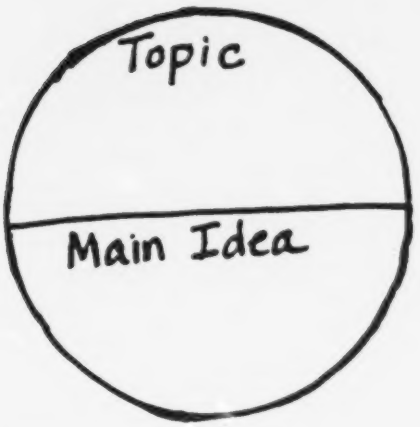
2. From this activity, I learned.....

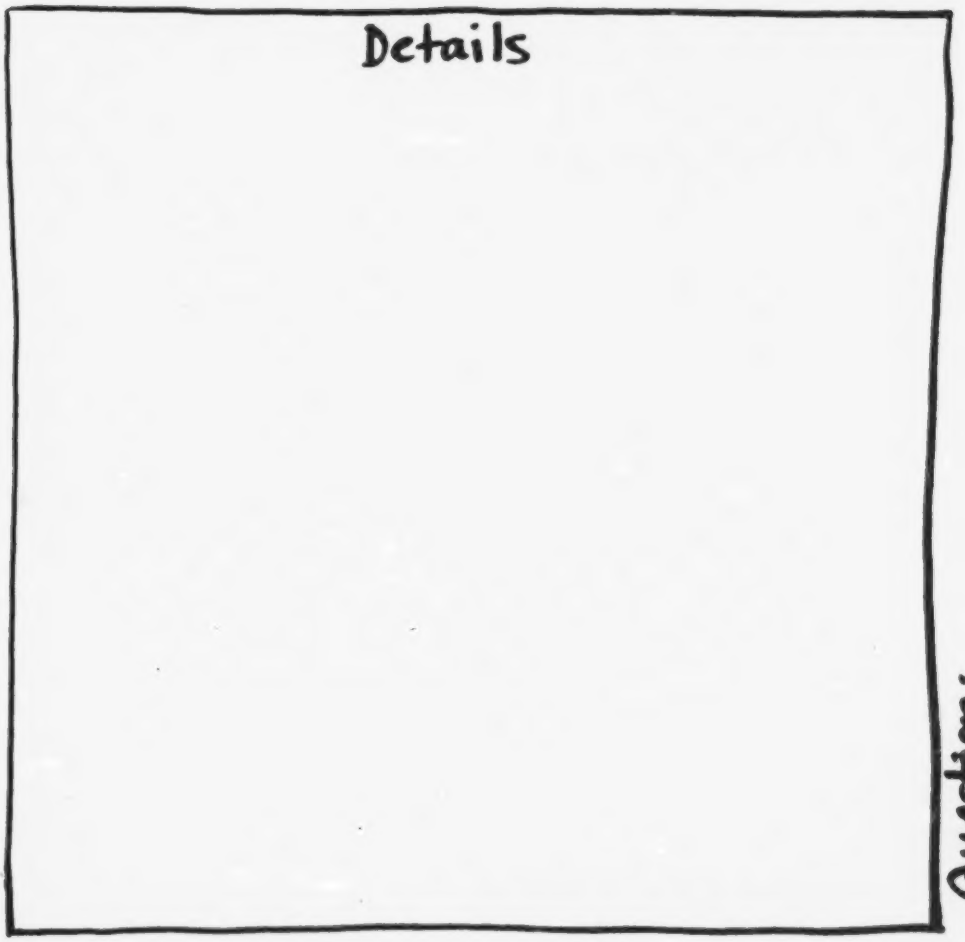
3. Presenting the information collected in front of my classmates gave me a feeling of.....

4. I would like to do more activities like this because.....

APPENDIX H

GRAPHIC ORGANIZER





APPENDIX I

SITE B: GRAPHIC ORGANIZER
SECOND INTERVENTION
STUDENT SAMPLE

On the test I learned many things, I learned about decimals, addition & subtraction of decimals. I also learned ~~that~~ how to identify multiplication problems. I also learned about estimation. All of these things will be useful in throughout the course of my life. Estimation is an important part of my life, because I use it every day of my life. As a matter of fact I use Estimation in my life right now. like when I go to a theme park or something. This is what I learned from the test, and how I will use it.

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APPENDIX J

SITE B: STUDENT GOAL JOURNAL
THIRD INTERVENTION
STUDENT SAMPLE

GOAL JOURNAL

GOAL	ACTION TAKEN
1. to add itegers	do more problems
2. order of operations	ask for help
	stay after school.

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APPENDIX J - CONTINUED

SITE B: STUDENT JOURNAL SAMPLE
THIRD INTERVENTION

What I Did

Big (but not all of the) idea. Explain what you actually did, giving some details but mostly tell the big idea.

I took a math quiz

What I Think

Reflect on the activity. What are the pluses and minuses? What other thoughts do you have?

My Reflections of the math quiz are it really helped me out a lot. I learned that it is very good to know math because if I don't I wouldn't be able to buy something in life because I wouldn't know how much money I need to spend. I like math a lot.

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APPENDIX J - CONTINUED

SITE B: STUDENT JOURNAL SAMPLE
THIRD INTERVENTION

What I Did

Log your use of the idea. Explain what you actually did, giving some details but mostly just the "big idea."

I sat on rug on the
first. I learned some
important skills for
later in life. It taught
responsibility because you
had to keep the promise
I'll use this skill from
going to need for my
job which I want to
be a vet.

What I Think

Reflect on the activity. What are the pluses and minuses? What other thoughts do you have?

I think the box helped
me because it taught
me things like how
to be responsible. It
taught me skills I will
need later in life.

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APPENDIX J - CONTINUED

SITE B: STUDENT JOURNAL SAMPLE
THIRD INTERVENTION

NAME [redacted] DATE 11-19-97

TOPIC Algebra

1. Key ideas from this discussion:
   1 step problems
   using this in real-life

2. Connections I can make with other ideas:
   How to find missing #
   estimating answer

3. Questions I still have:
   Can I do more of
   this.

APPENDIX K FOR SITE A

SAMPLES OF STUDENTS JOURNAL ENTRIES
OF GRAPHIC ORGANIZER

① What I liked best about yesterday's activity was that you had a budget and you could buy whatever you wanted. This helps us learn to live in the real world and I liked that.

② From this activity, I learned that if you buy things you should often think about tax. Also I learned you should have shiping and handling and tip all worked out to.

③ Presenting the information infront of my class mate gave me a feeling of excitement because we could explain what you have to pay for including tax. Also sales like 50% and 30-5% off

④ I would like to do more activity's like this because it was fun to look at what you could buy with a low budget. Also it helps prepare me for real life experiences like this one.

1) what I liked best about yesterday's activity was..... when we got to calculate all the items and then make the poster. I also liked finding terms that range.

2.) From this activity, I learned..... how to calculate with the tax and add up all the items. I also learned that you have to also take off the percent.

3.) Presenting the information in front of my classmates gave me a feeling of excitment because my group and I got to show the work we had down. We also got to show our poster.

4.) I would like to do more activites like this because.... it was fun. I also would like to do more because it taught me more about taxes and percents.

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APPENDIX K CONTINUED

1. What I liked best about yesterdays activitys was that I learned how to figure out tax and tip. I also thought it was a for activity. It was even better doing it with a group

2. From this activity, I learned how to figuer tax and tip witch will come in handy and I also learned shiping and handling. It was a good review for simple adition and multiplacation

3. Presenting in front of my classmates gave me a feeling of pride because I was showing them how to do this.

4. I would like to do more activitys like this because like I said befor it is a good review for adisyio and multiplacation. It also helps me learn what I will have to learn later in life

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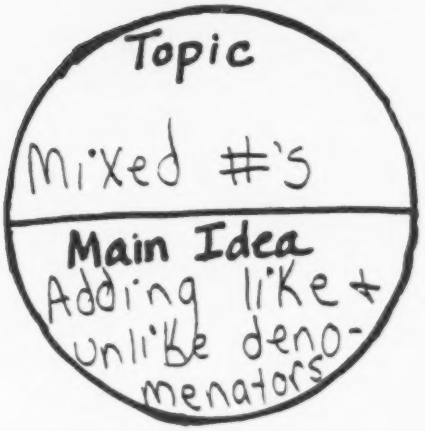
APPENDIX L FOR SITE A

SAMPLES OF STUDENTS' WORK
ON GRAPHIC ORGANIZER

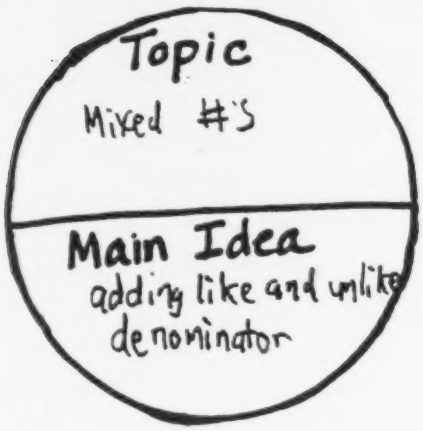


Details

1. First add your whole #'s together
2. Next if the denominator of both fractions are the same, then add the numerators. If not, find a common denominator + multiply both of the fractions by that
3. Then add the whole # to the fraction.
4. Reduce

Question: If you have two mixed #'s with different denominators, what steps do you need

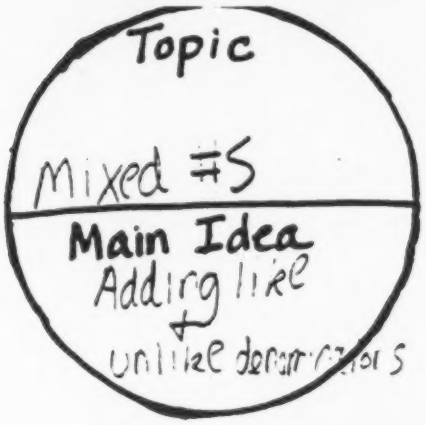
APPENDIX L CONTINUED



Details

1. look at the denominators
2. change the denominator of each numbers to there least comon denominator.
3. Add the numerators together but not the denominator
4. If the numerator is larger then the denominator change it to a mixed number.

Question: Bill, Larry and Dan bought a two litter bottle of pop. Bill drank 9/10 of a litter. Larry drank 1/2 of a litter. Dan drank 3/5 of a litter. Did they drink all of the pop.



Details

1. change Denominators to be same
2. add the whole numbers.
3. change the numerator by times ing them by what the denominator was x by
4. add only the denominator
5. Put the whole number on to the fraction
6. Reduce!

Question: One Bike rider rode $1\frac{2}{5}$ miles and another rode $2\frac{3}{7}$ how much did they ride together

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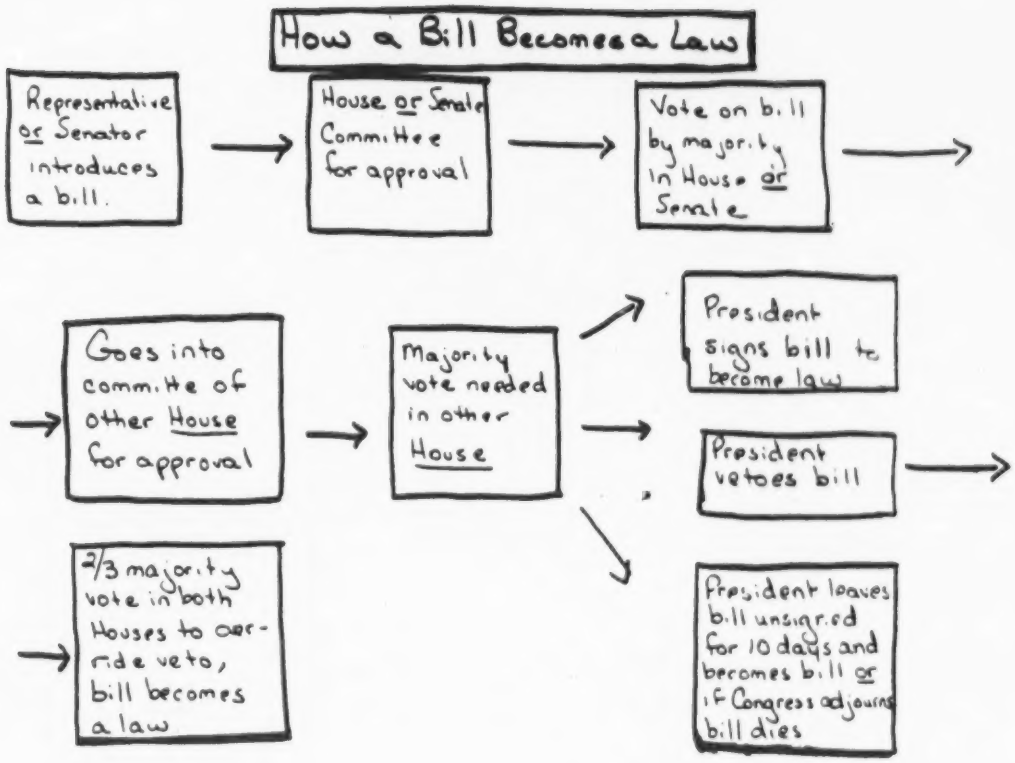
APPENDIX M FOR SITE C

GRAPHIC ORGANIZER


How a Bill Becomes a Law
Representative or Senator introduces a bill.
House or Senate Committee for approval
Vote on bill by majority in House or Senate
Goes into committee of other House for approval
Majority vote needed in other House
President signs bill to become law
President vetoes bill
President leaves bill unsigned for 10 days and becomes bill or if Congress adjourns bill dies
2/3 majority vote in both Houses to override veto, bill becomes a law

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APPENDIX N FOR SITE C

OUTLINE - NOTETAKING

CHAPTER 10 SECTION 1 NOTES pp 221-226

I Washington's Cabinet
- A. Sec. of State - Jefferson
- B. Sec. of Treasury - Hamilton
- C. Sec. of War - Knox
- D. Attorney Gen. - Randolph
- E. Postmaster Gen. - Osgood

II Federal Courts
- A. Congress given power to organize the courts - Judiciary Act
- B. John Jay - 1st Chief Justice

III National Debt - Hamilton's Plan
- A. pay off old debts, issue new ones
- B. pay off states' debts
- C. establish U.S. Bank
- D. tariffs on foreign countries

IV U.S. Bank
- A. deposit money from taxes
- B. issue money
- C. loan money to citizens
- D. pay bills

APPENDIX O FOR SITE C

LEARNING LOG

Sect 2 p. 202-205 Name: _____

Main Idea	Facts
Constitutional Convention	

Summary:

Question:

APPENDIX P FOR SITE C

STUDENT SAMPLE A FOR STUDY SKILLS

Sept. 19
per 7
reflect

Social Studies

1. What was I suppose to prepare for the test?
   ~~Social~~ study
2. How did I study for the test? if not, why
   NO, because I left my book in my locker. OUCH!

What can I do to improve my studying? =

3. I can study notes, ~~read over~~ read in the book what your going to be tested on.

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APPENDIX P FOR SITE C

STUDENT SAMPLE B FOR STUDY SKILLS

Reflect 9-19-97

1. What was I suppose to ~~sto~~ do to prepare for the test. I was suppos to study for the test

2. How did I study for this test of not why? I looked over the words in my speak

3. What can I do to improve my studing I could study more better than befor I can stay in for one hour befor going out. I can come in at a certain and study some more

APPENDIX Q FOR SITE C

RESEARCHERS' JOURNAL ON PROJECT-BASED LEARNING INTERVENTION

After students took the early American simulation project test, I conducted a class PMI. Comments were:

plus
+ like working in groups
+ like no textbooks
+ no homework, everything done in class & groups
+ felt they understood colonial life better

minus
- didn't get to work with friends
- difficult working in groups
- project to short (wanted more time)

? When can we do this again

My thoughts: Test scores better ☺ + on the short answer question, students showed transfer by responding (over 50%) that the most difficult skill colonists had to learn in New World was the skills needed to work together as a group. Some students included skills as communication and compromise as examples. I believe from this test + the PMI discuss transfer is evident in 1st intervention. They experience hardship the colonists went through via the simulation + record the hardships on the test questions.

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APPENDIX R FOR SITE C

STUDENT SAMPLE A
JOURNAL ON GRAPHIC ORGANIZER

Part 2 - Answer the questions honestly and completely.

6. How did you study for Section 2 quiz?

7. How did you study for Section 3 quiz?

8. Which quiz do you think you scored better? Why?

9. Do you think graphic organizers help you learn better? Why or why not?

6. I read the chapter and memorized stuff that I thought would be important.

7. I didn't

8. Section 2, because I studied

9. Yes, because they keep me in order and ~~so~~ I'm not an organized person

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APPENDIX R FOR SITE C

STUDENT SAMPLE B
JOURNAL ON GRAPHIC ORGANIZER

Part 2 - Answer the questions honestly and completely.

6. How did you study for Section 2 quiz?

7. How did you study for Section 1 quiz?

8. Which quiz do you think you scored better? Why?

9. Do you think graphic organizers help you learn better? Why or why not?

6 I read the book

7 read book and the notes

8 This more because I studied realy hard

9 Yes, Because I don't have to keep ongoing to look for my notes and swiftching pages.

APPENDIX S FOR SITE C

STUDENT SAMPLE A
JOURNAL ON LEARNING LOG

Dec. 11 '97
per. 7

① List the steps of the notetaking?
Will first you find out what you need notes on. then when you figure that out, third you write about ~~who, what, where, and when.~~ stuff that is important.

② Do you think the notetaking process has helped you learn the meterial in ch. 7. why or whynot? Yes because it helps you figure the important things out on your own.

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APPENDIX S FOR SITE C

STUDENT SAMPLE B
JOURNAL ON LEARNING LOG

12-11-97
reflect

1. List the steps of the note taking process. Find the most important information. or Write it in a graphic organizer. find out what happens (results)

2. Do you think the note taking process has helped you learn the material in Ch. 9. yes, because you made us do the work and find the answers.

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APPENDIX S FOR SITE C

STUDENT SAMPLE C
JOURNAL ON LEARNING LOG

12-11-97
reflect

1. List the steps of the notetaking process. First form a T-chart on the left side write main idea at the top on the right side write down facts. Up under main idea write down your topic. And up under facts write down facts about your topic. The type of information you would use would when did it take place where did it take place and why did it take place.

a. Do you think the notetaking process has helped you learn the materials in Ch. 9? Yes. I do Why? I think so because yesterday after we got through reviewing our notes. It felt like it was so fresh in my mind. It felt like you could have asked me any question and would have been able to answer it. Also if you forget things about the topic you can go back and look it up.

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APPENDIX T

UNIT 2 CUMULATIVE TEST

In 1–15, write each expression as a single decimal.

1. $10^5 \times .0356$
2. 50 billion
3. $.0001 \times 25$
4. 3 millionths
5. 2.81×10^4
6. $\frac{2}{5}$
7. 5.6×10^{-6}
8. $4\frac{1}{8}$
9. $\frac{1}{10{,}000} \times 50$
10. seventy-five hundredths
11. 10^6
12. four and two thousandths
13. 5^4
14. $\frac{5}{12}$ truncated to the ten-thousandth
15. 10^{-4}
16. What power of ten equals one ten-thousandth?
17. In 5^8, what is the 5 called?
18. In 5^8, what is the 8 called?
19. Which is larger: 5^8 or 8^5?
20. Write the key sequence to enter 5^8 on your calculator.

In 21–23, complete the chart. Write your answer on the line.

Fraction	Decimal	Percent
21. ?	0.13	13%
$\frac{5}{8}$	22. ?	62.5%
$\frac{237}{100}$	2.37	23. ?

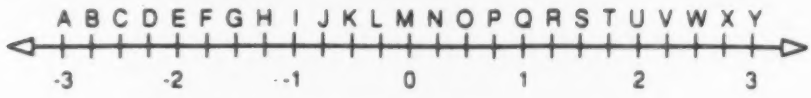
APPENDIX T CONTINUED

In 24 and 25, show your work.

24. What is 60% of 80?

25. What is $\frac{1}{2}$% of 1000?

26. Which letter corresponds to each position?



a. -2

b. 1.5

c. $-\frac{3}{4}$

d. an integer that is neither positive nor negative

e. a point between $\frac{1}{3}$ and $\frac{2}{3}$

27. A chlorine atom has a radius of .0000000000099 meters. Write this number in scientific notation.

28. What is one advantage of writing a number such as that in Question 27 in scientific notation?

29. You invest $1,000,000 in a certificate of deposit paying 8.23% a year. How much interest will you earn the first year?

In 30 and 31, consider that the world population projected for 1990 is 5.25 billion people.

30. Write a key sequence to enter 5.25 billion into your calculator.

31. About 11.6% of the world population follows the Muslim religion. Assume this percent does not change. To the nearest *ten million*, estimate the number of Muslims in the world in 1990. Write your answer as a decimal.

Now check all your work carefully.

APPENDIX U

UNIT 3 CUMULATIVE TEST

You will need a ruler marked in inches and centimeters, a protractor, and your calculator

1. ____ ounces = 1 pound

2. 1 inch = ____ centimeters

3. ____ mg = 1 kg

4. Write the symbol for a ray with endpoint P passing through point Q.

5. What term describes two lines which intersect to form a right angle?

6. Which is largest: 1 gram, 1 pound, or 5 kilogram?

7. A square city block is $\frac{1}{8}$ of a mile on each side. What customary unit could be used to measure the area of the block?

8. What is an appropriate metric unit for measuring the height of a baby?

9. What is an appropriate U.S. system unit for measuring the amount of water in a washing machine?

10. 100 yards = ____ feet.

11. Which is larger, 1 kilogram or 2 pounds?

12. Draw a line perpendicular to the line at the right.

13. Measure the segment below:

a. to the nearest mm

b. to the nearest $\frac{1}{4}$ in.

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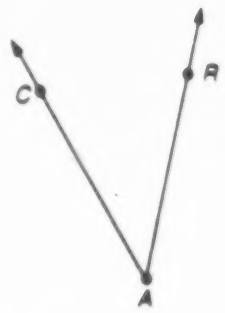
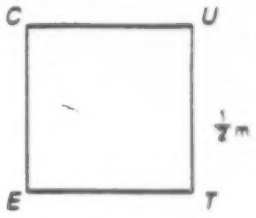
APPENDIX U CONTINUED

14. Measure $\angle CAR$ to the nearest 5 degrees

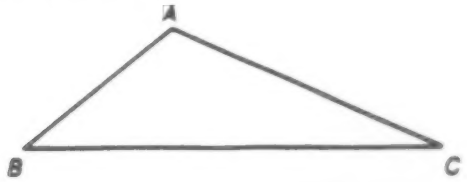


15. What is the area of square *CUTE*?



16. A sugar cube is 2 cm on each side. What is its volume in cubic cm?

17. In $\angle ABC$, determine whether the given angle is an acute, an obtuse, or a right angle.



In 18–27, write each expression as a single decimal.

18. 3 trillion

19. 5 thousandths

20. 10^{-4}

21. $\frac{1}{12}$

22. 350%

23. 3^0

24. 4.72×10^0

25. $9\frac{1}{4}$

26. $100.000 \times .025$

27. 3.1×10^{-5}

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In 28–30, show your work.

28. Write a fraction:

a. equal to $\frac{1}{3}$, with denominator 6

b. equal to $\frac{12}{18}$, in lowest terms

c. equal to 3, with denominator 6

d. equal to $.\overline{6}$

e. equal to 80%, in lowest terms

29. You buy a coat on sale for 30% off its original price of $59.95.

a. How much is the sale price of the coat?

b. Sales tax is 6% of the purchase price. How much is the sales tax?

c. What is the total price you pay for the coat?

30. In the last 6 months of the year, 17,866,798 issues of *Reader's Digest* were sold.

a. Round 17,866,798 up to the nearest million.

b. Round 17,866,798 down to the nearest million.

c. Round 17,866,798 to the nearest million.

d. Write your answer to c in scientific notation.

e. Write your answer to c as a decimal followed by a word.